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BIOLOGICAL EVALUATION FOR THE OCALA SAND PINE SEED ORCHARD

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INTRODUCTION

Seed orchard seed production is essential to the Southern Tree Improvement Program if genetic gains in improved tree forms, increased volume, improved fiber characteristics and insect and disease resistance are to be realized. Anticipated future demands for National Forest wood products make it imperative that the Ocala Sand Pine Seed Orchard reaches full production as soon as possible. Therefore, to meet the goal of full production, solutions or controls need to be developed or considered for any problems which reduce tree growth or seed production.

The Ocala sand pine, *Pinus clausa* (Chapm.) Vasey, orchard is presently in the planting and establishment stage with seed production several years away. The primary concern is tree establishment and reducing insect attacks that may affect the tree's vigor, thereby increasing tree mortality.

Major insects considered in this evaluation are tip moths, *Rhyacionia* spp., pine tortoise scale, *Toumeyella parvicornis* (Cockerell) = (*numismaticum*), aphids, *Cinara* sp., and pitch eating weevil, *Pachylobius picivorus* Germar.).

This report reflects the occurrence and possible seriousness of the insect infestations experienced on the seed orchard.

METHODS

This report consists of two surveys conducted on March 24, 1976 and June 10, 1976.

The survey conducted in March consisted of sampling approximately 6 percent of the trees in blocks 1-4. Data were taken

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on the presence of aphids, scale, and deer brouse damage. Tip moth attack was recorded if it occurred in the top five terminals (one or more tips infested = tree infested). All living trees in block 1 were surveyed in June 1976. Data recorded for tip moth included terminals infested and the infestations of the next four laterals. Data were also recorded for each living tree to include aphids, scales, and deer brouse damage present.

Data were summarized and indicated in their respective evaluations dated April 29 and July 20, 1976 (Tables 1 and 2).

RESULTS AND DISCUSSION

The March survey showed 6 percent of the trees with one or more of the top five tips infested with tip moths. A later survey in June showed tip moth infesting 15.2 percent of the terminals and 8.7 percent of the next four laterals.

Tip moth infestation by *Rhyacionia* spp. is presently the primary concern of the seed orchard. Possible damage consists of retardation of height growth, the crooking or forking of main stems, the reduction of cone crops, and occasionally the death of the tree (Baker, 1972).

Studies by Burns 1966 and 1968 on sand pine forest tree plantings in west Florida indicate that trees of the Ocala race were not as resistant to insect and disease attack as the Choctawhatchee race. He indicated that first year mortality was high in the Ocala race and that height growth losses due to tip moth may be negligible.

Little other work has been done on sand pine under seed orchard conditions. As the trees become established, there would be less justification for continued control of tip moth to reduce height growth losses. However, until the trees are established, every effort must be made to increase the trees vigor by reducing insect attacks.

In April 1976, 41 percent of the trees were infested with aphids while in June 39 percent were infested. Aphids cause damage by sucking plant juices and reducing plant vigor. Several aphid species are known to cause branch damage or death to young trees (Baker, 1972). No information is available on the significance of aphid infestation on sand pine but reduction of tree vigor with a heavy infestation may be a factor. Aphid predators and parasites were present and it is felt that they will keep the aphid population at low levels and that little or no impact will be seen from the aphid population.

Table 1. Percent of trees with tip moth infestation, aphid infestation, terminals twisted/distorted and deer brouse present on the Ocala Sand Pine Seed Orchard, Ocala National Forest, near Ocala, Florida, on March 24, 1976.

	Tips* Infested Tip Moth	Trees Aphid Infested	Trees Deer Broused	Terminals* Twisted/Distorted
Block 1	7	48	3	38
2	7	46	18	40
3	4	45	10	24
4	3	27	17	40
Total for all blocks:	6	41	12	35

* one or more of the top five terminals affected.

Table 2. Percent tip moth infestation of terminals and top four laterals and percent trees with aphids, pine tortoise scale and deer brouse by clone in block one of the Ocala Sand Pine Seed Orchard, Ocala National Forest, near Ocala, Florida. on June 10, 1976.

Clone	Terminal Infested	Laterals Infested (1-4)	Aphids	Deer Brouse	Pine Tortoise Scale
1	22.2	19.4	88.9		
2		10	30		20
3	10	10	20	10	20
4	22.2	22.2	22.2		11.1
5		7.5	70		
6	10	10	50		20
7		5.6	11.1		
8	11.1	2.8	22.2		
9	10	2.5	40		
10	11.1	1.1	44.4		11.1
11	10	5	60		
12	*				
13	40		50		
14	10	12.5	60		
15	11.1	30.5	11.1		
16	10	7.5	50		10
17	30	15	20		
18	12.5	6.3	25		12.5
19	10	7.5	20		
20		7.1	28.6		
21	20	7.5	40	10	10
22		3.1	12.5		
23	11.1	2.8	33.3		
24	11.1				
25	20	7.5	50		

Table 2 Continued.

Clone	Terminal Infested	Laterals Infested (1-4)	Aphids	Deer Brouse	Pine Tortoise Scale
26	30	20	40	10	
27	30	7.5	40		
28	40	12.5	30		
29	40	7.5	40	10	10
30	28.6		14.3		
31	20	17.5	70		10
32	12.5	6.3	62.5		12.5
33	20	10	60		
34		3.1	37.5		
35			60		20
36	*				
37	*				
38			70		
39	30	7.5	20		30
40	11.1	5.6	55.6		
41	28.6				
42	14.3	7.1	28.6		14.3
43	10	12.5	50		
44		7.4	50		
45	10	5	40		10
46	22.2	8.3	33.3		
47	20	2.5	10	10	20
48	10	17.5	40		
49	33.3	8.3	10		
50	10	15	70		
Average	15.2%	8.7%	38.9%	1%	5.2%

*Clone was either not planted or no representative members survived.

No scale insects were found in the March survey, but a later more intensive survey of block 1 in June showed pine tortoise scale infesting 5.2 percent of the trees. Pine tortoise scales suck plant juices and may be a factor in reducing plant vigor. Heavy tortoise scale populations may result in considerable branch mortality or death of the tree (Baker, 1972).

The Francis Marion Seed Orchard has experienced mortality of shortleaf pine associated with heavy tortoise scale populations. Seed orchard and pest management personnel must be on the lookout for population fluctuations and spread of this insect.

During the June survey, adults of the pitch eating weevil were found on the foliage and bark of several seed orchard trees. No feeding was observed. They were attracted to the orchard by a land clearing operation in progress at the time which will eventually allow for expansion of the orchard. Damage is often serious in recently cut pine stands where seedlings are planted soon after harvest. The damage consists of adults feeding on the bark and twigs of seedlings planted near freshly cut stumps (Baker, 1972). If trees are to be planted on the freshly cleared land next spring (1977), control may be necessary. If planting is planned for the following spring (1978), no insect problem is anticipated.

SUMMARY

Potential insect losses to seed orchard trees are threefold: bark and twig feeding by pitch eating weevils may kill individual trees; terminal and lateral feeding by tip moth may result in stunted, crooked, and/or forked trees while pine tortoise scale and aphids which suck the plants juice may reduce the trees vigor leading to stunted or dead trees. Seed orchard tree establishment is critical at this time because the present orchard will soon reach the age where new trees can no longer be interplanted.

Insect damage to seed orchard trees is expected to continue next season and the trees will continue to need protection from insect damage.

RECOMMENDATIONS

1. To control tip moth, apply Cygon® 2E at the rate of 4 pints per 100 gallons of water. This should be applied for each generation when larvae are migrating on external portions

of shoots. This can be done by determining peak moth activity from caged infested tips and spraying about 7-10 days later. Thorough coverage of tips is essential.

2. Southwide tests on loblolly, sand, shortleaf, and slash during 1974 and 1975 showed Furadan® to be promising for tip moth control (Merkel and Hertel, 1975; Overgaard, et. al., 1976). If Furadan® becomes registered, consideration should be given to its use in Federal seed orchards in lieu of Cygon®.

3. Approved safety equipment shall be used when applying Cygon®.

4. Control recommendations are not recommended for aphids, pine tortoise scale or pitch eating weevil at this time as insect population levels are felt to be insignificant.

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